Dr hab. Mariusz Matyka Assoc. Prof.
Department of Systems and Economics of Crop Production
Institute of Soil Science and Plant Cultivation
State Research Institute in Puławy

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Review of PH.D dissertation

mgr Talal Saeed Hameed

titled: „Adoption of sustainable agriculture principles by potato farmers in the south-eastern Poland".

prepared in
Department of Plant Production Technology and Commodity Sciences
Faculty of Agrobioengineering
University of Life Science in Lublin
under the supervision of
prof. dr hab. Barbara Sawicka
and
dr Dominika Skiba

Agriculture is a basic human activity, which enabled the development of civilization. However, with the beginning of the industrial revolution, also in this branch of production, there was a significant acceleration and reorientation of development directions. This process has a special intensity in the second half of the twentieth century and was associated mainly with the introduction of mechanical draft force, mineral fertilizers, chemicals plant protection and significant progress in plant breeding and organizational of farms. Despite many drawbacks to this direction of development, it has to be said that it has allowed it to tackle the problem of hunger in a large part of the globe. It should be pointed out, that the development of agriculture based on industrial means of production is associated with an increase in the negative pressure on the natural environment. This also applies to potato, which is a plant of great market importance, but its cultivation requires a number of agrotechnical treatments and large amounts of industrial inputs. The undesirable consequences of this process began to emerge in Western Europe as early as the 80s last century. As a result, a partial verification and reorientation of the agricultural sector functioning model has taken

place towards sustainable development. Stimulators of reducing the negative impact of agriculture on the environment are also an increase in social awareness and increased expectations for food safety. The process of implementing the principles of sustainable development in agriculture should be based on objective premises, and therefore a diagnosis of the current state is necessary. The most effective directions and mechanisms for implementing these requirements should also be indicated. It should be assumed that an agricultural advisory service, which is the basic link in the transfer of knowledge to agricultural practice, should play a very important role in this respect. In recent years this problem has been the subject of interest of many institutions, ranging from scientific units through different levels of administration (EU, national) to business entities.

In light of these facts, the research taken by M.Sc. Talal Saeed Hameed on the assessment of the implementation of the principles of sustainable development by potato producers in south-eastern Poland should be assessed as interesting and current. The issues discussed in the dissertation are important for cognitive, methodological and utilitarian reasons.

The work submitted for evaluation involves 217 pages of manuscript, and a 32 pages of annex. The integral part of the dissertation are 98 tables and 20 figures, which illustrate the research results. Bibliography includes 517 items of literature, which are cited properly in terms of formal and substantive aspect. The title of the work is clear and adequate to its content. The main content of the study is presented in nine chapters, arranged as follows: 1. Introduction, 2. Review of the literature, 3. Material and methods, 4. Research conditions, 5. Result and discusion, 6. Conclusion, 7. Recommendations, 8. Refereces, 9. Appendices. The work layout is logical and meets the requirements for Ph.D. dissertations. The paper is generally written in understandable language and allows for easy tracking of the research carried out and analysis of the presented results.

Logically linked to the review of literature, the research hypothesis and the purpose and scope of paper have been set in a synthetic and they do not make any doubt.

The basis for the preparation of the dissertation were research based on the primary data collected between 2014-2016 on a representative sample of 152 potato farms in Lubelskie and Mazowieckie Voivodeship. These included the assessment of social, environmental, organizational and economic indicators. They also characterized the sources of knowledge acquisition by farmers and implementation of agri-environmental programs in 2007-2013 & 2014-2020 RDP. The second part of assessment included the role of agriculture advisory in the adoption of sustainable principles by farmers cultivating potatoes. The main part of the dissertation is the assessment of the degree of implementation of the sustainable agriculture principles by farmers cultivating potatoes. The choice

and scope of the research methods and adopted evaluation criteria can be considered sufficient, and allow the realization of the research objective and verification of the hypothesis.

Description of the results shows a good understanding of the Ph.D. Student in the subjects covered by the research. The Author has shown that farmers cultivating potatoes in the south-eastern part of Poland adopted the sustainable agriculture principles in a medium level with tendency to low. An important conclusion of the study is the fact that farmers in the highest degree implement the principles of sustainable development in the field of fertilizers and fertilization, while the smallest in the area of production management. Seed production and control of harmful organisms ranked, respectively, in the second and third positions. Based on the obtained results, it has also been shown that the implementation of the sustainable development principles among farmers cultivating potatoes in the south-eastern Poland is dependent on variables such as: age, educational level, marital status, source of incomes, form of land use, source of professional information's, livestock production, storage, packing and sale of potatoes. On the other hand, regression analysis has shown that the implementation of sustainable development depends on: source of incomes, source of professional information's, sale of potatoes, farm size, educational level, gender, structure of sown area and occupation. In the paper also has been shown that agricultural advisory services in most of the surveyed farms (53%) play a medium or low (34%) role in the implementation of sustainable development. Therefore, it is necessary to strengthen the transfer of knowledge in this field to farmers cultivating potatoes.

Discussion of the results has a multi-threaded character and was based on extensive literature. Generally, the Ph.D. Student skilfully confronted the results of his own research with the data and opinions of other authors. The conclusions and recommendations contained in the dissertation were mostly formulated in a correct manner.

Nevertheless, the reading of the disertation induces some critical and polemic comments which do not undermine the merits of the work.

General comments:

- In the keywords, the Author pointed out the „implementation of farmers", which should be considered as incorrect.
- In the paper , the author used the sign "bigger than" incorrectly, e.g. <20ha, while it appears from the context that the value is over 20 hectares.

Comments to chapter „Review of the literature":

- This chapter is too extensive. It seems that some of the issues could be described in less detail, and some of the subsections unrelated to the research could be abandoned e.g. 2.4.6. Diseases of potato, 2.4.7 Insect pests of potato

Comments to chapter „Material and methods":

- In indicator „ implementation of agri-environmental programs" did not include changes that occurred in RDP between 2007-2013 and RDP 2014-2020.
- The "family size" indicator is imprecise and does not contribute much to analysis. It only describes the number of people in the household who work in agricultural production. However, there is no information at what time dimension they work on the farm. Proper analysis should be based on the AWU-Annual Work Unit indicator.
- There is no information as to whether normality of distribution and homogeneity of variance were tested before the choice of the parametric test, which is the analysis of variance.
- In the following part of the paper t-test is used, but it is not mentioned in the chapter „Statistical methods and data analysis".

Comments to chapter „Research conditions":

- Figure 17 duplicates the contents of Figure 16, so it is unnecessary.
- Subchapter 4.4. „Dependence of potato yield on soil and climatic conditions" should be part of the chapter "Review of the literature".

Comments to chapter „Result and discusion":

- There is data discrepancy between Tables 10 and 12. Namely, the data in table 10 indicate that 96.7% of the respondents worked full-time on the farm. On the other hand, in Table 12, the result is that only 74.3% of farmers receive income exclusively from the farm and 23.0% from the farm and employment outside it.
- Page 125 - Doctoral Student interpreting the results of the area structure states that "only" 36.8% of the farms surveyed had an area bigger than 50 ha. It should be emphasized, however, that this share is significantly higher than the average for Poland or the analyzed region. Therefore, this type of data should be interpreted in the background of Central Statistic Office (CSO) data.

- The data in tables 18 and 19 are inconsistent. It is not possible that 4 farms (tab. 19) cultivated potatoes in area < 5ha if 5 farms (tab. 18) have the total area of < 5ha. If the data were consistent, then these values should be at least equal.
- Pages 126-127 – the name of indicator „kind of farm land" is incorrect and should be „utilization agricultural area". In addition, the content of table 20 shows that this is the share of the dominant form of land use, not their structure.
- Page 127 – the name of indicator „structure of farm land" is incorrect and should be „structure of sown area". Furthermore, the contents of table 21 shows that it is rather indicator characterizing the dominant species in the farm which is cultivated on the largest area. Consequently, the interpretation of the indicator is also incorrect. The author points out, for example, that 52% of the farms cultivated potatoes, which is incompatible with the basic methodological assumptions of paper.
- Page 128 – the name and interpretation of indicator „soli quality class" is incorrect. Table 22 shows that this is an indicator characterizing the structure of the surveyed farms according to their dominance soil quality class. It is not possible for a farm to have only one soil quality class.
- Page 129 – indicator "main production of farm" in a survey called as „main scope of farm" should by name „main direction of farm production".
- Page 130 – the characteristics of animal production should rather be presented on the basis of the indicator LU-Livestock Unit. In the present form data will make it impossible to refer to the scale of production and theoretically farm keeping 1 and 100 cows are in the same group. Also, the fact that all tested farms keep animals is different from the general situation in the country, so that data should be interpreted against the background of CSO data.
- Discussion in chapter 5.1. it is quite poor, and the opportunities in this area are considerable, as previously indicated on the basis of CSO data.
- In chapters 5.4. and 5.5. there is no discussion of own research results with available literature.
- In the interpretation of tables 40, 43, 46, 53, 56, 83, 86, 91, 94 discussing all relationship is unnecessary. It was enough to describe the statistically significant interactions.
- Page 178 – the regression equation was incorrectly written before the parameter 0,219 x_5 are signs„+-„, and should be „-„.

. *Comments to chapter „Conclusions":*

- Conclusions 1 and 2 do not result directly from the research, but rather from review of literature. In addition, they are related and should be linked.
- It would be wise to merge and shorten conclusions 7 and 8 and cumulate the information contained in conclusions 6 and 10. In addition, conclusion 11 is included in the conclusion 10 and can be waived.
- Conclusions should be arranged in the same chronology as the content of chapter "Results and discussion".

Comments to chapter „Appendices":

- There are some doubts that in the questionnaire on agricultural advisory only LODR was indicated, since the survey was also conducted in the Mazowieckie voivodship, that should also be indicated MODR or generally ODR.
- In the questionnaire about fertilization, farmers were asked whether they use mineral fertilization and if so at what doses. In the case of potassium and phosphorus, the question concerned the elemental form, but farmers generally refer to the oxide form. Therefore, some doubts may raise the question whether the respondents understood the question correctly?
- Annexes 2, 3 and 4 are unnecessary as they accurately reproduce the contents of the questionnaire enclosed in Annex 6.

In conclusion, I consider that evaluated Ph.D. dissertation M.Sc. Talal Saeed Hameed, entitled: „Adoption of sustainable agriculture principles by potato farmers in the south-eastern Poland" fulfills the conditions of the article 13th of the Act of March 14th, 2003 on the academic degrees and academic title and degrees and title in art (Dz.U. Nr. 65, poz. 595 as amended). **Therefore, I put forward a request of the High Council of Faculty of Agrobioengineering of the University of Life Science in Lublin to allow M.Sc. Talal Saeed Hameed to enter the subsequent stages proceedings, which are aimed and conferring a degree of doctoral of agricultural science in the discipline of agronomy.**